



**FISK LAND SURVEYING & CONSULTING ENGINEERS, INC.**  
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August 17, 2009

Vicki Fisher  
Growth Management Department  
City of Rapid City  
300 Sixth Street  
Rapid City, SD 57701

RE: Aspen Estates – Master Sewer Plan

Dear Vicki:

At the request of staff, I have examined the potential for central sewer service in the Aspen Estates Subdivision. Per the attached exhibit, I believe that gravity sewer would work within the Highway 44 right-of-way beginning just east of the Cavern Road intersection. It should also function on the southerly portion of Kenosha Road and Elkhart Road. The only lots to be directly served by the gravity sewer would be Lot 4 (Volunteer Fire Department) and Proposed Lot 5B (Walt Bradsky). Lot 9 may have the potential to direct gravity feed depending on the building site.

Lot 1 could potentially gravity to Nameless Cave Road if sewer and easements were to be made available there, otherwise it would require ejecting into a potential force main in Cavern Road.

Lots 2, 3, Proposed 5A, 6, 7, 8 and possibly Lot 9 would need to individually eject (E-1) into a force main until the force main reaches the gravity connection.

However, the County has specified the use of advanced treatment units for the proposed lots in question (5A and 5B). Per the previously submitted information, these units have been approved for use by DENR. The manufacturer of the Aqua Safe Class I Wastewater Treatment Plants states that "The results of the Aqua Safe process are a clear odorless effluent discharge, which meets and exceeds state and national water quality standards."

Based on the limited number of lots to be served by central sewer in this location, individual advanced treatment units would be an environmentally effective and more economical alternative to City maintained central sewer. The installation and maintenance of these units would be the responsibility of the individual landowners and it is my understanding that the manufacturers of these systems specify the appropriate maintenance and inspection for their respective system.

Certainly in the instance of Mr. Bradsky's lots, groundwater protection will be greatly enhanced by the installation of the advanced treatment unit on the proposed lot and the conversion of the existing system for Mr. Bradsky's residence.

Sincerely,  
FISK LAND SURVEYING & CONSULTING ENGINEERS, INC.

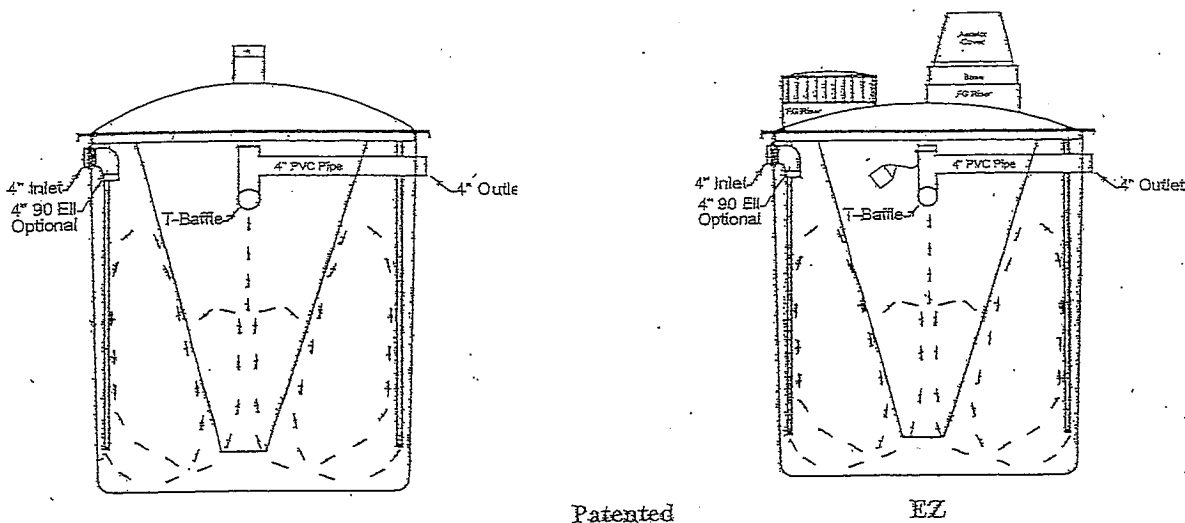
Warren L. Fisk, PE, LS  
Senior Engineer

# AQUA SAFE®

“The standard by which the performance of other units is compared”®

## Class I Wastewater Treatment Plants

### OWNER'S MANUAL



- |                                       |                                       |                                       |                                      |
|---------------------------------------|---------------------------------------|---------------------------------------|--------------------------------------|
| <input type="checkbox"/> Model AS500  | <input type="checkbox"/> Model AS600  | <input type="checkbox"/> Model AS750  | <input type="checkbox"/> Model AS800 |
| <input type="checkbox"/> Model AS1000 | <input type="checkbox"/> Model AS1200 | <input type="checkbox"/> Model AS1500 | <input type="checkbox"/> EZ Top      |

## INTRODUCTION

All Aqua Safe series models are certified based on provisions in ANSI/NSF Standard 40. The Ecological Tanks, Inc., Aqua Safe model AS500 has been tested by the Baylor University Department of Environmental Studies according to requirements listed in ANSI/NSF Standard 40, and meets and exceeds Class 1 effluent requirements.

Installation needs vary in each state, therefore your wastewater treatment plant may contain auxiliary components with the treatment plant not furnished by Ecological Tanks, Inc. Included in this owner's manual are the Aqua Safe model numbers AS500, AS600, AS750, AS800, AS1000, AS1200 and AS1500 series wastewater treatment plants.

State and/or local regulations govern the installation and use of individual aerobic wastewater treatment systems. All permits required by state and/or local regulations should be obtained prior to the Aqua Safe plant installation.

It is the responsibility of the end user (owner) to see that the Aqua Safe plant and associated auxiliary component items are installed in accordance with all applicable laws, regulations and guidelines in effect in your respective state. Please consult your local sanitarian or environmentalist prior to system installation.

## AQUA SAFE WASTEWATER TREATMENT PLANT PROCESS DESCRIPTION

Ecological Tanks, Inc., Aqua Safe model numbers AS500, AS600, AS750, AS800, AS1000, AS1200 and AS1500 are made up on an outer mixing compartment a center settling or clarifier compartment. They are in many ways similar to large township or municipality sewage treatment plants. They employ an extended aeration activated sludge process. This type of treatment depends primarily upon the use of air that is introduced by air passing from the aerator compressor to four air lines located around the perimeter of the aeration mixing compartment. As wastewater enters the aeration mixing compartment simple hydraulic displacement is accomplished by the introduction of air which promotes the growth of aerobic organisms in much larger quantities than would occur naturally. These bacteria break down the organic solids in the wastewater. From the aeration mixing compartment, mixed liquid enters the cone shaped settling or clarifier compartment from the bottom. No mixing occurs in this quiet zone where solids separate from the liquid and settle to the bottom of the clarifier and re-enter the mixing compartment. The liquid that separates from the

solids in the clarifier continue to flow upward to the discharge pipe. The results of the Aqua Safe process are a clear, odorless effluent discharge, which meets and exceeds state and national water quality standards.

## AQUA SAFE RECOMMENDED PLANT INSTALLATION INSTRUCTIONS

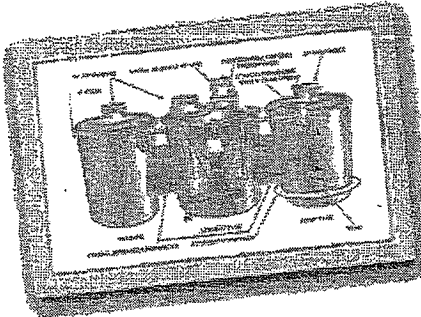
1. Inspect entire treatment plant and component parts.
2. Select location of plant site which is accessible to the home sewer discharge line, at least ten (10) feet from the home foundation, in an area that will not receive vehicular traffic. Prepare an excavation site by digging hole at least one (1) foot larger than the treatment plant and a depth that will allow for sufficient coverage leaving approximately three (3) inches of the inspection port to extend above normal ground level. The depth of the plant will be controlled by the depth of the building sewer outlet line plus the amount of proper fall required from the building sewer outlet line to the inlet invert of the plant. The prepared excavation should have a solid, level bottom that will eliminate plant settling. Additionally, the bottom of the excavated hole should be free of rocks or sharp objects. Aqua Safe plants should be installed on a bed of sand on undisturbed soil to provide a solid flat base.
3. Utilizing lifting lugs provided, carefully place the plant in the excavation. The inlet line should slope down toward the plant and the outlet line should slope down away from the plant. The plant should be level within one (1) inch, edge to edge. Aqua Safe wastewater treatment plants should only be connected to properly trapped and vented plumbing systems in compliance with state and local plumbing codes.
4. Position the inlet and outlet lines and make the necessary connections. Clean-outs should be installed at building sewer tie-in, any changes in direction of flow and at maximum intervals of seventy (70) feet when using four (4) inch piping. The inlet line should be inserted and glued into the inlet elbow and the discharge line should be inserted and glued into the outlet coupling. Open the inspection port on top of the plant and make sure the discharge tee assembly is level and centered in the clarifier prior to connecting discharge piping. Fill the tank with water to the point of flowing discharge before backfilling. Backfill evenly around the plant, up to the bottom of the inlet and outlet piping, taking care not to damage the tank or dislodge the piping. Backfill material must be void of rocks, gravel, heavy clay or any type of material which might damage the tank.
5. The aerator compressor must be installed in a well ventilated, relatively clean and dry location. Install the aerator compressor on the treatment plant's tank top or at a

Home History The System Features Services FAQ Request Estimate Contact  
Distributors of Aqua Safe Treatment Systems Manufactured by ETL NSF/ANSI 40

Environmentally Friendly

### The System

The Aqua Safe® system is a scaled down version of a larger township and municipality sewage treatment plant.

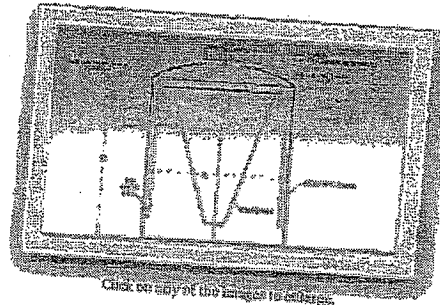


The extended aeration process is a unique treatment that depends primarily upon the use of air that is introduced by passing from the blower to four air lines located around the perimeter of the mixing chamber.

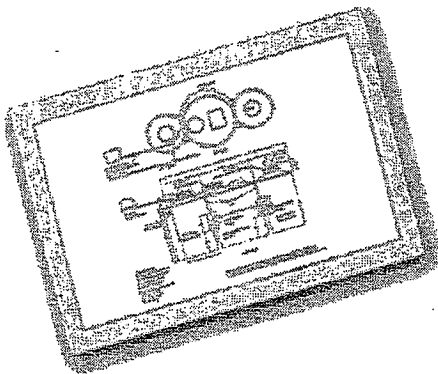
Aqua Safe® plants are made up of outer mixing tanks and a settling chamber called a clarifier. Raw unsettled wastewater from your home enters directly into a mixing tank where simple hydraulic displacement is accomplished.

The introduction of air promotes the growth of aerobic organisms in much greater amounts than would naturally occur, thus breaking down the organic solids in the wastewater.

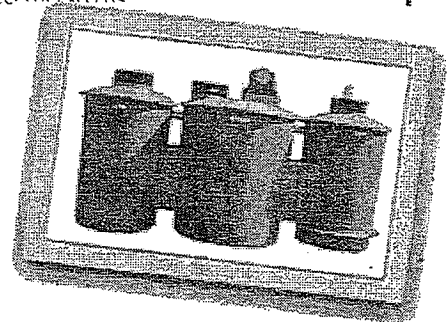
From the outer mixing tank or aeration chamber, mixed liquid enters the cone shaped settling chamber, better know as the clarifier, from the bottom. No mixing occurs in this quiet zone where solids separate from the liquid and settle to the bottom of the clarifier and re-enter the mixing chamber. The liquid that separates from the solids in the clarifier continues to flow upward to the discharge pipe.



Click on any of the images to enlarge.



The result of the Aqua Safe® process is clear, odorless, effluent discharge, which meets or exceeds state water quality standards.



PO Box 1196 Port Mill, SC 29716 803-324-3684 Office 803-324-4558 Fax

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May 15, 2008

MEMO TO: Interested persons

FROM: Scott Hipple - State DNR all permits to go thru him  
Environmental Regional Scientist

SUBJECT: Manufactured drainfield systems

There has been much interest in the various types of manufactured drainfield systems that are allowed for use in South Dakota and the reduction in the total absorption area allowed if these systems are used. I dug through the files and came up with the following products and the reductions allowed for them. These have recently been reviewed and there has been a change in equivalent trench width allowed on the 15" and 22" chambered units.

1. Eight-inch diameter gravelless pipe (Hancor Inc., Prinsco Inc., Goldline GLP, or Advanced Drainage systems, Inc brands). We feel this is equal to a 2-foot wide trench. No reduction in absorption area is given for these products.
2. Ten-inch diameter gravelless pipe (same companies as above). We feel this is equal to a 3-foot wide trench. No reduction in absorption area is given for these products.
3. Plastic Tubing Industries, Inc. Multi-Pipe Drainfield System. Allowed for use in South Dakota. Reduction in absorption area never requested by the manufacturer and so no reduction has been given. Product equal to a 3-foot wide trench.
4. PSA, Inc. Bio Diffuser Stoneless Wastewater Disposal System. Four models are available. The 11" high and 14" high models, and the ARC 36 model which are approximately 34" wide and are equivalent to a 3-foot wide trench. The ARC 24 model is equivalent to a 2-foot wide trench. A 20% reduction in total absorption area is allowed for these products.
5. Hancore, Inc. Standard and Hi-Capacity Envirochambers are equivalent to a 3-foot wide trench. The Narrow Envirochamber™ (15" wide) is equivalent to a 1.5 foot wide trench. A 20% reduction in total absorption area is allowed for these products.
6. Infiltrator Systems Inc. chambers. There are four different sized models: 15" wide, 22" wide, 34" wide, and 36" wide models. We feel the 15" wide model is equivalent to a 1.5-foot wide trench. The 22" wide model is equivalent to a 2-foot wide trench. The 34" & 36" wide models are equivalent to a 3-foot wide trench. A 20% reduction in total absorption area is allowed for these products.

So far, that's all of the "drainfield" type products I can find in the files. There may be other manufacturers that market similar products and these companies should get DENR's approval prior to marketing those products in South Dakota.

As of November 7, 2002, all chamber units, 8-inch gravelless pipe, or 10-inch gravelless pipe are approved as experimental systems for use in a serial distribution system (sloped terrain system) and shall meet the requirements of Administrative Rules of South Dakota 47:53:01: 28(3) & 40.

The following non-concrete septic tanks have been reviewed, meet the 1,000 pounds per square foot vertical load requirement, and are approved for sale in South Dakota.

→ 1. EZ TANKS, Inc. (only the 1,250 gallon polypropylene dual compartment tank)

The following advanced treatment units have been submitted to DENR and are approved for installation as part of a standard drainfield design. If you are going to install one of these units, you must submit the drainfield design to DENR for review and approval.

- Aqua Safe Model Series 500, 600, 750, 800, 1000, 1200, and 1,500 aerobic treatment units. Manufactured by Ecological Tanks, Inc.
- Singlair Model Series TNT 500 and TNT 500 with UV disinfection.
- Nayadic Inc., Models M-6A, M-8A, M-1050A, M-1200A, and M-2000A.
- Multi-Flo Wastewater Treatment Systems, Inc., Models FTB-0.5, FTB-0.06, FTB-0.06-C, FTB-0.75, FTB-0.75-C, FTB-1.0, FTB-1.0-C, and FTB-1.5FTB-0.5.
- Consolidated Treatment Systems, Inc., Models ENV-075 and ENV-0.75 M.
- Orenco Models AdvanTex AX20, AdvanTex AX20 with UV disinfection, AdvanTex AX20N, AdvanTex AX20N with UV disinfection.

Miradri 860 and Miradri 861, BONSAL Sure-Coat, Tamms Industries' Tamoseal, and RPM Company's TREMCO have been approved to provide secondary containment around septic tanks, lift stations and other components that have the lowest construction joint less than four feet to seasonal high ground water or bedrock. These products have been approved to cover the tank or other components with, inside or out. These materials may be used provided all the manufactures installation requirements are followed.

If you have any questions, please feel free to contact me at the above address.